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Firm growth in developing countries: Driven by external shocks or internal characteristics?

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Abstract

The purpose of this paper is to assess the importance of external shocks relative to internal characteristics in explaining variation of firm growth in developing countries. To do so, we compile firm-level panel data covering 12,562 firms operating in 72 low-income and middle-income countries. Our statistical analysis reveals that, on average, firm characteristics account for a half of difference in growth rate across firms. However, the importance of internal factors is halved when we exclude firms in the tails of the distribution (top performers and worst performers). On the other hand, external shocks account for less than one tenth of variance. The role of external shocks is, however, stronger for young firms and for firms operating in unstable environments. Finally, our findings suggest that the external context is more crucial for exit than for growth.

Keywords: Firm growth; Developing countries; Firm characteristics: External shocks

JEL classication: D22; L25; O14

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1 Introduction

The need to create sustainable jobs is an urgent need worldwide, especially in many developing countries due to demographic challenge ahead. Because they provide stable jobs, the development of formal firms is of prime interest for policymakers and academics. In the absence of formal jobs, a majority of young people in developing countries is confronted with unsatisfied alternatives such as creation of subsistence activities or migration. Firms in developing countries are often informal and consist of single-worker activities. Formal enteprises are not only less numbered but also smaller than those operating in industrialized countries (Hsieh and Olken, 2014). A few firms are able to grow over the life-cycle (Hsieh and Klenow, 2014; Eslava et al., 2019). Large firms are often large at birth (Ayyagari et al., 2020).

Many efforts have therefore been devoted to understand and tackle obstacles to (small) firm growth in developing world. A first generation of works has highlighted the importance of the institutional context in which firms operate to explain difference in growth rates. These works investigate the impact of financial development (Beck and Demirguc-Kunt, 2006), fiscal and regulatory framework (Klapper et al., 2006), corruption (Fisman and Svensson, 2007) or the lack of instractructures (Cole et al., 2018). A new body of research, which will gain interest with the recent Covid-crisis, has concentrated on the impact of external shocks (commodity price booms and busts, natural disasters, epidemics or civil conflict) on the dynamics of firms in developing countries (Bowles et al., 2016; Elliott et al., 2019; Dosso and Léon, 2020).

Another strand of literature has focused on firm-level attributes. Premilinary works have focused on observable structural characteristics of the firm (size, age or sector) or of the entrepreneur (education, experience) to explain performance of firms (see Nichter and Goldmark, 2009; Woodruff, 2018). In the footsteps of Bloom and Van Reenen (2007), recent articles have considered the internal organization of the firm. These papers focus on the impact of (changes in) managerial practices as a strong determinant of firm performance (Bloom et al., 2013; McKenzie and Woodruff, 2016). This approach dedicating a special attention to firm-level attributes is in line with a rich literature in managerial science about the drivers of firm growth (Coad, 2009). Two major theories of the firm

(the resource-based view and evolutionary economics) assume that growing firms have specific resources or attributes that permit them to outperform their competitors.

The aim of this paper is to adopt a new perspective by assessing the relative importance of internal (firm) characteristics versus external factors[1] in explaining variation of employment growth in developing world. Rather than focusing on a specific (internal or external) factor, we measure the explanatory power of both strands of explanations. To do so, we exploit the World Bank Enterprise Surveys. We follow a panel of 12,562 firms operating in 72 developing countries over the period 2006-2018. We decompose the total variance of firm growth between explained variable (by the model) and unexplained variance (residual variance). We consider models including internal and external factors separately and then jointly. For internal factors, we consider in addition to structural characteristics of the firm (size, age, ownership), firm fixed effects allowing us to account for (unobserved) time-invariant characteristics (such as entrepreneur structural characteristics or weakly time-varying internal organization). For contextual factors, we assess the importance of sectoral and local shocks, irrespective of their origin. To do so, we add sector-country-time dummies that account for sectoral shocks occurring in one country in one period and (sub-national) location-time dummies taking into account local shocks.

To briefly summarize our results, we show that firm-level factors explain the largest share of variance of firm growth. Approximatively one half of variance is explained by firm characteristics. At the opposite, external shocks account, on average, for less than 10% of total variance. In detail, we document that the role of internal factors is predominant for leaders (best performers in the long-run) and losers (worst performers). When we exclude leaders and losers the contribution of internal factors is halved. In addition, the role played by local and sectoral shocks is stronger for young firms (below 10-year old) and for firms operating in unstable environments. However, we fail to detect a real difference between firms according to their size. Finally, we suggest that external factors play a stronger role in explaining exit than growth. However, this finding is just suggestive insofar as models for exit and growth are not directly comparable.

Our article contributes to the literature on firm dynamics in developing countries.

[1]Throughout the paper, we interchangeably employ firm characteristics and internal factors on the one hand; and, on the other hand contextual factors and external factors.

Recent works have shown that firm dynamics is weakly explained by within-firm growth in developing countries (Hsieh and Klenow, 2014; Eslava et al., 2019; Ayyagari et al., 2017, 2020). This paper adds to this literature by examining the relative importance of internal and external factors in explaining differences in within-firm growth. In doing so, we employ a data-driven methodology to study the weight of each explanation. Closest to our paper is Ayyagari et al. (2020). The authors document that size at birth is crucial to explain variation in firm size and growth over the life cycle, contrary to institutional factors. Our work complements this article by adopting an alternative, albeit complementary, perspective. Contrary to Ayyagari et al. (2020) we are not interested by specific firm- or country-level characteristics but rather by the explanatory power of internal versus external factors, irrespective of their sources. In addition, we focus not only on institutional characteristics but also on shocks occuring within a country at a local or sectoral level. Finally, we are able to follow closely the evolution of entreprises, rather than exploiting only initial and final observations. In this respect, our work is more closely related to Ayyagari et al. (2017) and Eslava et al. (2019), which follow new ventures in India and Colombia to characterize their life-cycle dynamics. We cannot track firms each year but our sample includes a large number of emerging and developing countries. In this way, we propose a new way to exploit the panel version of the WBESs.

This article also resounds with macroeconomic debate about growth. Economic growth is highly unstable in developing countries (Easterly et al., 1993; Rodrik, 1999; Pritchett, 2000). While growth accelerations are frequent, they rarely persist over time and are highly unpredictable (Hausmann et al., 2005). Microeconomic evidence points out that the same process also occurs at the firm-level (see Léon, 2020, for a review). Our work offers a new perspective by directly scrutinizing the impact of shocks on firm growth. Our statistical analysis documents that external shocks have a limited power, on average, to explain differences in firm growth. Nonetheless, these shocks have a stronger effect on small firms and for firms operating in highly unstable countries.

The paper proceeds as follows. Section 2 presents the data and variables. Section 3 discusses the methodology. Section 4 presents baseline results and extensions. The last section concludes.

2 Data and variables

2.1 Data

We rely on the most comprehensive firm-level survey data; the World Bank Enterprise Surveys (WBES). In an ideal set-up, we would employ administrative data or census. However, these datasets are rarely available in many developing countries and are not always comparable across countries.[2] The WBES are collected in face-to-face interviews with top managers and business owners and cover a large range of topics. While the survey is not mandatory, WBES are plant-level surveys of a representative sample of an economy's formal private sector.

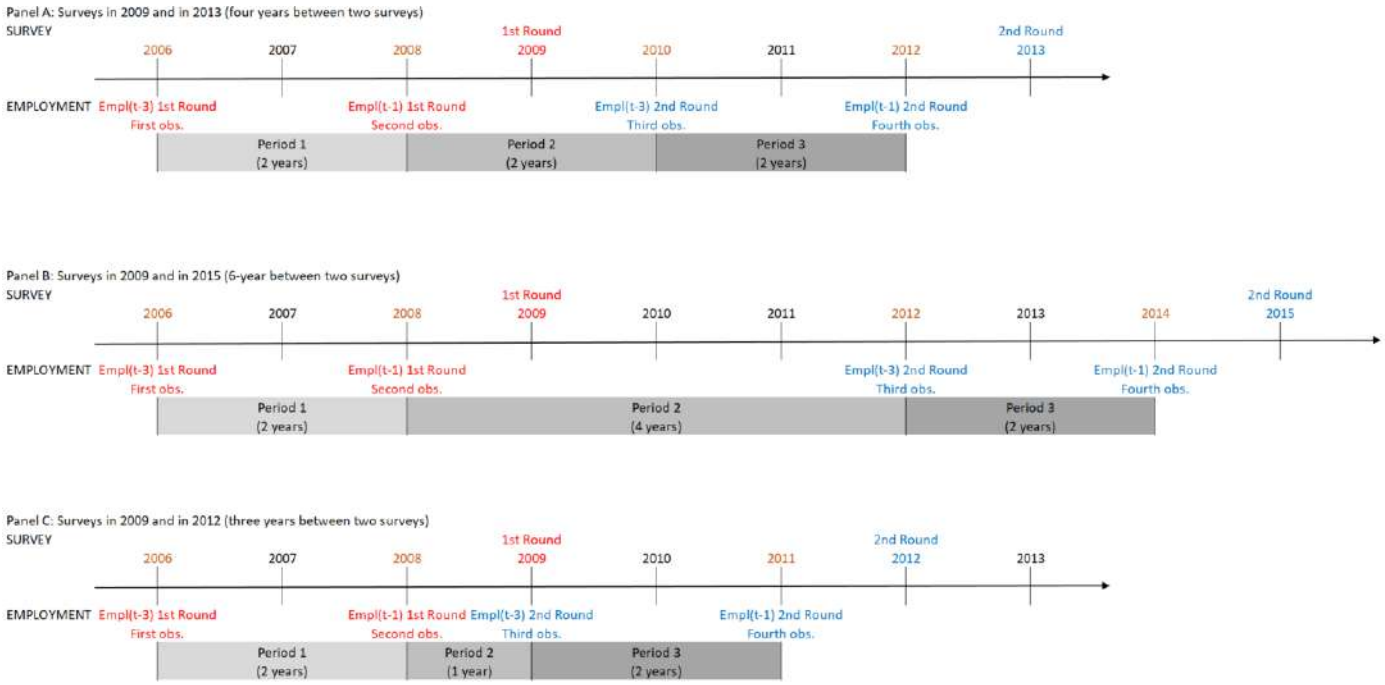
Recently, the WBES' staff has built a panel by interviewing the same firm during different waves. We therefore consider all firms with at least two observations (two waves) to be able to track firm growth over time. This rule creates a survivorship bias. First, in some countries, there is no panel version of the WBES. Second, when interviewers try to recontact firms surveyed in a previous wave, they sometimes fail because firms were inactive in the second wave or because they were not surveyed for another reason (refuse to answer, impossible to contact them, etc.). These firms are therefore dropped in the analysis. Fortunately, the WBES give information about why a firm was not re-interviewed in the second wave. We present evidence in the following indicating that our findings are not driven by a survivorship bias.

After compiling firms with at least two surveys, we transform data to construct firm growth at different periods. For each wave, we know the number of employees in the past year and three years before the survey. These variables allows us to compute three periods of growth for each firm surveyed twice. To describe the procedure, we take the example of a firm surveyed in 2009 and in 2013, as shown in Panel A of Figure 1. For this firm, we know the number of employees for four different years: 2006, 2008, 2010 and 2012. Indeed, we get information on employment in the year before the surveys (i.e., 2008

[2]Data on firms can be extracted from three different sources: administrative data, census and surveys. Administrative data covers the universe of (formal) firms and are often updated regularly (each year). They provides basic information such as date of creation/exit, location, number of workers. Sometimes, they can also include basic financial figures (assets, sales, profit). Census are between administrative data and surveys. They are implemented less frequently than administrative data and do not cover the universe of firms. However, their participation is mandatory.

and 2012) but also three years before for each survey (i.e., in 2006 for the first survey and in 2010 for the second survey). Based on these four values, we are able to compute job growth for three different periods (of two years each): 2006-08; 2008-10; and 2010-12.

Figure 1: Description of period calculation



The previous example of two surveys separated by four years is not only the most simple (because we get three 2-year periods) but it is also the most frequent, as indicated in Table 1 . Indeed, 45% of surveys are separated by four years. In Figure 1, we investigate two alternative possibilities. In Panel B, we consider two surveys separated by six years (e.g., Malawi) and in Panel C two surveys separated by three years (e.g., Russia). The former situation occurs frequently. The time lapse between two surveys in the same country is of 5 years in 12% of surveys and 6 or 7 years in 19% of surveys (cf. Table 1). The latter situation is less frequent (only 8% of surveys were separated by three years).[3] The first period and third period are unchanged (2-year). Only the second period is affected by the time lapse between surveys because it exploits information from two

[3]We exclude Myanmar because two surveys were implemented with only two years between them (2014 and 2016).

different surveys as indicated in Figure 1. We discuss the sensitivity of our econometric results to this point in the robustness checks.

Table 1: Sample of firms per country

Country	Round			Number of		Country	Round			Number of	
code	1st	2nd	3rd	Firms	Obs.	code	1st	2nd	3rd	Firms	Obs.
AFG	2008	2014		37	98	MKD	2009	2013		176	471
AGO	2006	2010		163	377	MLI	2007	2010	2016	188	516
ARG	2006	2010	2017	623	2,013	MNE	2009	2013		53	135
ARM	2009	2013		161	411	MNG	2009	2013		123	324
AZE	2009	2013		69	165	MWI	2009	2014		84	205
BEN	2009	2016		59	150	NER	2009	2017		56	147
BGD	2007	2013		119	347	NGA	2007	2014		355	878
BGR	2009	2013		70	204	NIC	2006	2010	2016	211	627
BIH	2009	2013		113	310	NPL	2009	2013		230	659
BLR	2008	2013		119	329	PAK	2007	2013		225	601
BOL	2006	2010	2017	252	757	PAN	2006	2010		121	265
BTN	2009	2015		112	315	PER	2006	2010	2017	536	1,774
BWA	2006	2010		116	302	PHL	2009	2015		375	1,030
CIV	2009	2016		121	276	PRY	2006	2010	2017	205	642
CMR	2009	2016		157	419	ROM	2009	2013		97	275
COD	2010	2013	2013	91	240	RUS	2009	2012		126	352
COL	2006	2010	2017	499	1,581	RWA	2006	2011		68	180
DOM	2010	2016		98	238	SEN	2007	2014		231	575
ECU	2006	2010	2017	212	650	SLE	2009	2017		75	203
EGY	2013	2016		629	1,591	SLV	2006	2010	2016	262	796
ETH	2011	2015		369	1,016	SRB	2009	2013		119	333
GEO	2008	2013		81	220	SUR	2010	2018		55	151
GHA	2007	2013		31	89	TCD	2009	2018		69	189
GTM	2006	2010	2017	322	965	TGO	2009	2016		59	144
HND	2006	2010	2016	159	457	TJK	2008	2013		33	92
IDN	2009	2015		422	929	TLS	2009	2015		85	186
KAZ	2009	2013		77	198	TUR	2008	2013		125	315
KEN	2007	2013	2018	380	1,162	TZA	2006	2013		115	325
KGZ	2009	2013		43	120	UGA	2006	2013		200	479
KHM	2013	2016		130	359	UKR	2008	2013		187	470
KSV	2009	2013		9	26	UZB	2008	2013		138	368
LAO	2009	2012	2016	195	528	VEN	2006	2010		138	346
LBR	2009	2017		81	222	VNM	2009	2015		294	828
LSO	2009	2016		60	157	YEM	2010	2013		135	361
MDA	2009	2013		179	465	ZMB	2007	2013		151	408
MEX	2006	2010		202	532	ZWE	2011	2016		302	833

Data were retrieved in October 2019. We consider all firms include in the panel version of the WBES (i.e., re-interviewed firms). Nonetheless, we exclude observations when the interviewer did not believe that answers were trustful (question *a16*). The final sample includes 12,562 firms (34,701 observations) operating in 72 low-income and middle-income countries over the period 2006-2018, as indicated in Table 1.

2.2 Variables

2.2.1 Firm growth

Although sales growth and employment growth have often been used, individually and interchangeably, it has become increasingly evident that these measures are not equivalent. Each indicator has its advantages and drawbacks. In this work, we consider employment growth for several reasons. First, employment growth has the advantages to be less sensitive to very short-term variations and measurement issues (e.g., deflation, exchange rate, manipulation of reported sales or profit). Furthermore, employment is a better indicator for multi-product firms. However, our choice to focus on employment growht is mainly driven by two additional arguments. First, employment is often the explicit target for political authorities who seek job creation. Second, our analysis relies on managers' answers to surveys (and not to administrative data). The interviewers ask the level of sales and employment in the past year and three years before the surveys. So, a manager in year t (e.g., 2018) should recall her level of employment and sales not only in $t-1$ (2017) but also in $t-3$ (2015). We may expect that a manager is more able to recall the number of employees than the level of sales three years before the survey.

We use the number of full-time and permanent employees in the past year and three year before the survey (questions $l1$ and $l2$ in the consolidated WBES). To avoid the regression-to-the-mean effect (Haltiwanger et al., 2013), we compute the growth of employment as the change of the employment during the period t and the previous period $(t-n)$, divided by the firm's simple average of employment (instead of using the initial value) as follows:

$$g_{it} = (E_{it} - E_{it-n})/X_{it} \qquad \text{, where} \qquad X_{it} = \frac{1}{n-t} \times (E_{it} + E_{it-n})$$

where E_{it} is the level of employment at year t for firm i and E_{it-n} the level of employment at year $t-n$. The growth rate measure is symmetric about zero, bounded between -2 and 2 (when the time span equals two years).

Table 2 displays (annualized) growth rate. On average, firms experience a positive growth (+2.4% per year). The growth rates are lower in lower-middle income countries

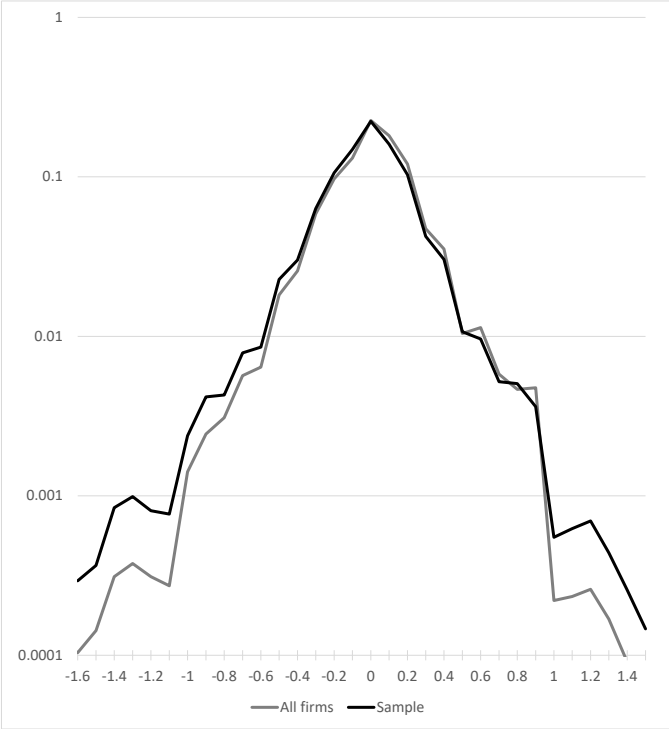
and higher in Latin American and South Asia. The distribution of growth rates typically display heavy tails (Coad, 2009). We confirm this feature in Figure 2. We plot the density of annual growth rates of employment for all countries (using a semi-logarithmic scale). We consider not only firms included in the analysis (black line) but also all firms available in the WBES (in grey). We confirm that the distribution of growth resembles a tent-shaped. More than 20% of firms experiences no growth and the probability mass is located around zero. Interestingly, we point out that distribution of growth for sample used in this paper is very similar to that for all firms avalaible in the WBES. This is reassuring for the representativeness of our sample.

Table 2: Descriptive statistics

Sample	Obs.	Mean	Std. Dev.	Q1	Median	Q3
All	34,701	0.024	0.254	-0.059	0.000	0.125
By income						
Low-income	6,181	0.021	0.258	-0.070	0.000	0.135
Lower-middle income	16,087	0.016	0.269	-0.070	0.000	0.111
Upper-middle income	12,433	0.037	0.231	-0.045	0.018	0.135
By region						
East Asia and Pacific	4,184	0.008	0.208	-0.050	0.000	0.091
Europe and Central Asia	5,259	0.000	0.273	-0.098	0.000	0.118
Latin America and Carribbean	11,794	0.043	0.206	-0.038	0.022	0.130
Middle East and North Africa	1,952	-0.011	0.507	-0.144	0.000	0.121
South Asia	2,020	0.034	0.206	-0.050	0.000	0.125
Sub-Saharan Africa	9,492	0.028	0.243	-0.064	0.000	0.140

Another frequent feature of firm growth distribution is the lack of persistence especially for firms in the tails of the distribution, even in developing countries (Coad et al., 2018; Léon, 2020). The best performers in one period often fail to continue outperforming in the future, and inversely. We confirm this feature on an international basis by using the WBES. A simple coefficient correlation is negative ($\rho = -0.10$). A quantile regression confirms this finding and indicates, in line with recent papers, that persistence is lower at the tails of the distribution (see Figure A1 in the Appendix). The lack of persistence in growth rates raises a concern regarding the importance of (time-invariant) firm's attributes in explaining growth. However, this feature does not prove that external factors matter to explain firm dynamics.

Figure 2: Distribution of firm growth (semi-logaritmic scale)



2.2.2 Determinants of firm growth: Internal vs. external factors

Our analysis seeks to distinguish between firm-level attributes and contextual variables to explain variation in growth rates across firms. To select firm-level variables we follow the previous literature on the determinants of firm growth. First we consider firm age and firm size. There is a vively debate to know if small and/or young firms experience higher level of growth (Nichter and Goldmark, 2009; Haltiwanger et al., 2013; Aga et al., 2015, among others). The role of foreign capital has to be taken into account as well, with foreign ownership is generally recognized as an accelerator of firm growth. Indeed,

foreign-owned firms may exhibit better growth performances due to their advantage in technology and foreign market penetration in comparison with domestic firms (Arouri et al., 2020). A burgeoining literature has pointed out the role of the characteristics of the individual entrepreneur (Nichter and Goldmark, 2009; Woodruff, 2018) or of the internal organization of the firm (Bloom et al., 2013; McKenzie and Woodruff, 2016). Due to the lack of relevant variables in the WBES, we consider only the experience of the manager (in the sector). These factors are, however, largely time invariant in the short-run. As a result, we include firm fixed-effects to take into account all these unobserved characteristics. We expect that these dummies will encapsulate the characteristics of the managers or owners as well as the internal organization (business practices, delegation, etc.) of the firm.

Our paper's aim consists on analyzing whether contextual factors influence firm growth. The existing literature on the relationship between firm dynamics and their environment often specify these contextual factors (external barriers such as lack of infrastructures or corruption or external shocks such as natural disasters or conflicts). We adopt another perspective because our aim is to quantify the average weigth of these factors. In other words, we do not define specific variables but we rely on a set of dummies that take into account all unobserved factors occurring at a level of analysis.

We consider time, sector and location dummies and their interaction. Time dummies are given by the period considered for each firm. For sector, due to lack of homogeneity in data, we re-classify firms in one into 11 sectors (Wood, Garments and textiles, Chemicals products, IT, Motor vehicles, Non-metallic product, other manufacturing, trade, services, transport, and unclassified activity). For location, we extract the most precise location of firms (city or region) and create a variable reporting firm's location inside the country. We have 363 different locations in our dataset (133 cities and 230 regions).

Based on these three sets of dummies, we create new variables accounting for different contextual factors. First, we include country-period dummies that account for all time-varying shocks occurring at the country level (such as national economic growth, institutional and political changes). Second, we consider changes at the sector-country-period level. Indeed, each sector in the same country can be affected by demand shocks

(due to a shift of demand) and/or a change in supply conditions (e.g., an increase in the price of an input, new competitors, new regulation). Finally, we include a set of dummies to take into account local changes, which can be positive (e.g., building of a new transport infrastructure, local expansion) or negative (e.g., a natural disasters). In doing so, we include (sub-national) location-period dummies.

3 Methodology

The aim of this paper is to assess the relative explanatory power of firm-level (internal) and external shocks in variability in growth. As a result, we rely on a rich literature in management science trying to explain differences in firms' performance (Rumelt, 1991; Hawawini et al., 2003; Short et al., 2007; Bamiatzi et al., 2016). The basic approach consists on exploiting an analysis of variance. The idea is to decompose total variance between explained variance by the model and the residual variance. We employ the simple fixed-effects model as a model. This approach does not require to assume a specific distribution law, contrary to other variance decomposition models (such as variance components models or mixed models).[4] To get a magnitude of the ratio of explained variance to total variance, we use the value of unajusted R^2. One limitation of our approach is the lack of rule of thumb (statistical thresholds) to indicate whether an increase in R^2 is statistically significant. In addition, the order of entry of the independent variable can have a large impact on which variable explains the most variance in the dependent variable. To avoid this issue, we adopt the following approach. In a first step, we consider a simple model that includes only one constant and a variable capturing the time span employed to compute employment growth (cf. Figure 1) as follows:

$$g_{iscrt} = \alpha_0 + time\_span_t + \varepsilon_{iscrt} \tag{1}$$

[4]There are three different methods: fixed-effects, random-effects (also called variance components model) and mixed-effects. While the random-effects model (and the mixed-effects model) is more efficient, it may suffer from bias because individual unobserved heterogeneity may be correlated with the independent variables (e.g., between firm specific effect and the experience of the manager). In addition, we have to assume that random-effects follow a normal law. It should be noted that the basic decomposition of variance method have been improved in the most recent works. For instance, Short et al. (2007) employ a hierarchical linear multilevel (HLM) model because their data are nested. We cannot rely on a HLM because data are not perfectly nested in our case. Firm fixed effect is not encapsulated in country-year effect (because the latter changes over time contrary to the former).

where g_{iscrt} refers to the growth of firm i, in sector s, in country c, in region r at the period t; α_0 is a contant and $time\_span_t$ is the duration considered to compute firm growth.

We consider two models allowing us to include firm-level factors. First, we then add (time varying) observable characteristics of the firm as follows:

$$g_{iscrt} = \alpha_0 + time\_span_t + \Gamma \mathbf{X}_{it} + \varepsilon_{iscrt} \tag{2}$$

where $\mathbf{X}_{it}$ refers to the time-variant characteristics of the firm: firm size (in terms of employees) and the firm age, the manager's experience and a dummy variable for foreign-owned firms.

We then extend Eq. 1 to consider firm time-invariant unobserved characteristics. In doing so, we add firm fixed effects (α_i) insofar as we observe a firm for at least three periods. The estimated model becomes:

$$g_{iscrt} = \alpha_i + time\_span_t + \varepsilon_{iscrt} \tag{3}$$

The firm fixed effects allows us to control for all time-invariant firm characteristics, including firm's internal organization but also characteristics of owners and/or managers. A major limitation of this specification is the inability to control for many time-variant unobserved characteristics (such as changes in management).

We then consider the weight of external shocks/contextual factors by adding the set of dummies presented in the previous section. We first consider a simple model adding to Eq. 1 only country-period dummies (μ_{ct}) allowing us to control for factors affecting all firms within the same country in the same period (e.g., civil conflicts, economic growth, institutional changes, etc.):

$$g_{iscrt} = \alpha_0 + time\_span_t + \mu_{ct} + \varepsilon_{iscrt} \tag{4}$$

We then refined Eq. 4 by considering two potential different sources of variation within a country. On the one hand, firms operating in the same sector may be affected by a common shock which is controlled by replacing country-period dummies by country-

sector-period dummies (μ_{cst}) as follows:

$$g_{iscrt} = \alpha_0 + time\_span_t + \mu_{cst} + \varepsilon_{iscrt} \quad (5)$$

Second, firms in the same location may be affected by a local shock that is captured by region-period dummies (μ_{rt}):

$$g_{iscrt} = \alpha_0 + time\_span_t + \mu_{rt} + \varepsilon_{iscrt} \quad (6)$$

An advantage to consider a baseline model (Eq. 1) and then include one by one alternative independent variables is to avoid the bias induced by the order of entry that shape value of R^2. As indicated in Table 3, the comparison of R^2 of different models allows us to compute the explanatory power of different internal and external factors. The increase of R^2 from Eq. 1 to Eq. 2 gives us the variance explained by observable firms' characteristics and the increase of R^2 from Eq. 1 to Eq. 3 by time-invariant unobserved firms' characteristics.
The change in R^2 from Eq. 1 to Eq. 4 allows us to compute the role of contextual factors at the country-period level. Eq. 5 and Eq. 6 help us to refine this analysis by focusing on sectoral and local shocks.

Table 3: Explanatory power (R^2)

From Eq. 1 to	Explanatory power
Internal factors	
→ Eq. 2	Observable firm's characteristics (age, size, sector, manager's experience)
→ Eq. 3	Time-invariant unobserved firm's characteristics
External factors	
→ Eq. 4	Shocks common for all firms in the same country (e.g., wars, growth, institutional changes, etc.)
→ Eq. 5	Shocks common for all firms in the same sector in the same country (e.g., regulation, etc.)
→ Eq. 6	Shocks common for all firms in the region/city (e.g., local economic context, etc.)

For technical reasons (the large number of dummies), we rely on a linear regression absorbing multiple levels of fixed effects (Guimaraes and Portugal, 2010). This approach does not change results regarding explanatory power. Another issue in our case is the lack of observations for sector (only one third of enterprises). As a consequence, we also

consider a restricted sample for firms with information regarding the sector.

4 Results

4.1 Baseline results

Table 4 displays baseline results based on the whole sample of firms. The first column provides information on models (from Eq. 1 to Eq. 6 and their combinations[5]). The second column gives the value of R^2 (unadjusted) and the last column presents the number of observations. Restricted refers to the sample of firms for which we have information on sector (around one third of firms only). In the rest of the table, we consider the impact of leaders and losers (see below).

Our main finding is that internal factors account for the largest share of variation in firm growth. Econometric results indicate that the combination of time-variant observable firms' characteristics (Eq. 2) and firm fixed effects (Eq. 3) explains more than half of variance in employment growth. At the opposite, external factors explain less than 10% of total variance. This result is in line with the literature on the relative role of firm, industry and country effects on performances (Hawawini et al., 2003; Short et al., 2007; Bamiatzi et al., 2016). These papers point out the firm effect is the strongest determinants of financial performances.

Among internal factors, we also document that firm fixed effect (unobservable time-invariant characteristics) account for the largest part of explanation of total variance (around one third). This finding corroborates findings from a growing literature on firm dynamics in developing countries documenting the importance of entrepreneur characteristics and firm internal organization (e.g., Bloom et al., 2013; McKenzie and Woodruff, 2016). In addition, as shown in Table A1 in the Appendix, we confirm results from existing papers regarding firm characteristics (Haltiwanger et al., 2013; Aga et al., 2015; Arouri et al., 2020): small, young and foreign firms experience higher growth than their counterparts. The impact of manager experience is, however, less clear-cut.

[5]For instance, "Eq2+Eq3+Eq6" refers to a model including $time\_span_t$ (always included), firms' observable characteristics from Eq. 2 ($\mathbf{X}_{it}$), firm fixed effects from Eq. 3 (α_i) and location-year dummies from Eq. 6 (μ_{rt}). In other words, we run the following models: $g_{iscrt} = \alpha_i + time\_span_t + \Gamma \mathbf{X}_{it} + \mu_{rt} + \varepsilon_{iscrt}$

Table 4: Baseline results

	All firms (1)		Excluding leaders and losers: Exclude both (2)		Exclude leaders (3)		Exclude losers (4)	
	R^2	Obs.	R^2	Obs.	R^2	Obs.	R^2	Obs.
Initial value								
Eq1	0.002	34701	0.005	29362	0.001	30991	0.007	33072
Eq1 (restricted)	0.003	12857	0.005	10875	0.001	11445	0.007	12287
Internal factors								
Eq2	0.046	32308	0.035	27397	0.041	28882	0.042	30823
Eq3	0.304	33387	0.232	28323	0.269	29855	0.282	31855
Eq2+Eq3	0.555	30508	0.261	26747	0.283	28174	0.310	30044
External factors								
Eq4	0.054	34701	0.067	29362	0.080	30991	0.056	33072
Eq5	0.068	12857	0.086	10875	0.090	11445	0.076	12287
Eq6	0.068	34701	0.083	29362	0.095	30991	0.070	33072
Eq5+Eq6	0.097	12857	0.120	10875	0.122	11445	0.104	12287
Internal and external factors								
Eq2+Eq3+Eq6	0.582	30508	0.568	25936	0.577	27292	0.587	29152
Eq2+Eq3+Eq6 (restricted)	0.650	10301	0.631	8743	0.633	9135	0.658	9909
Eq2+Eq3+Eq5+Eq6	0.658	10301	0.640	8743	0.642	9135	0.665	9909

The table displays R^2 of different specification. Eq1 to Eq6 refer to specification displayed in Section 3 and reported in Table 3. Eq1 is the model with only a constant and an indicator for time span. Eq2 refers to model with observable time-variant firms' characteristics, Eq3 to models with firm fixed effects. Eq4 to Eq6 concern external factors: Eq4 is the model with country-year dummies, Eq5 models with country-sector-year dummies and Eq6 models with region-year dummies. The combination of equation signals that we include several independent variables in the same model (e.g., Eq2+Eq3 means that we include both time-variant observable firms' characteristics and firm fixed effects). Restricted presents model for a sample of firms for which sector variable is available.

A common feature regarding growth in that a few (high-growth) firms tend to outperform the rest. While many firms experience almost no growth (cf. Figure 2), a few firms grow fast or decline sharply. The few fast-growing firms or fast-declining firms could influence the average. To account for this issue, we follow Hawawini et al. (2003) by excluding the top 5%-fast growing firms and the bottom 5%-fast declining firms.[6] The rest of Table 4 displays results when we exclude both leaders (top 5%) and losers (bottom 5%), and then we drop only leaders or only losers. In line with Hawawini et al. (2003), the exclusion of leaders and losers reduces explanatory power of internal factors. This finding points out that firm effects mainly occur for top performers and bottom

[6]To identify these firms, we rely on annual growth for the whole period by using the number of employees in the first observation and the number of employees in the last observation divided by time-span between both observations. For instance, if we consider a firm as shown in Panel A of Figure 1, we exploit information on the number of employees in 2006 and in 2012 and the period of observation is 6 years.

performers. For the sample of "normal" firms, firms' characteristics account for only one quarter of variance (contrary to a half when we add extreme performers). While external environment slightly increases, its explanatory power remains limited.

We run several robustness checks to confirm our main econometric results. First, Erhardt (2019) shows that measurement of growth (relative vs absolute) matter to study its dynamics. We therefore rerun models by considering absolute growth defined as the absolute difference in workers between n and t divided by the number of periods between n and t as follows: $\Delta E_{it} = [E_{it} - E_{it-n}]/(t-n)$. We obtain very close results as indicated in the first column of Table 5. Firm-level components explain one half of total variance. However, the use of absolute growth reduces the weight of external factors to explain growth (divided by four).

Second, as indicated in the description of data and variables, we exploit three periods of growth per firm (see Figure 1). While the first and third periods cover two years, there is a variation in the duration of the second period because the time span between two waves differs across countries (from 3 years to 8 years as indicated in Table 1). In the baseline analysis, we account for this issue by adding a variable ($time\_span_t$). In the second column of Table 5, we keep only the first, third (and eventually the fifth) periods, which are by definition of two years. Despite the reduction in the number of observations, we find very close results.

Third, our analysis excludes many firms for which we do not have information over different waves (because they exited before the second wave, they refused to answer or interviewers were unable to contact them). As a result, our sample could be far from representative of the sample of firms in developing countries. Figure 2 provides an indirect evidence that the sample considered seems representative of all firms in the WBES in terms of employment growth. As a robustness check, we directly test whether our findings are affected by the exclusion of these non-observed firms during a second round. In doing so, we rerun the models for all firms for which we are able to compute growth rate. Our sample largely increases (from 34,701 to 104,732 observations). Our findings, displayed in the third column of Table 5, are largely unchanged for the impact of external factors. However, the impact of firm-level factors is reduced to one third

(certainly because we cannot employ firm fixed effects for the majority of firms).

Table 5: Robustness checks

	Absolute growth (1)		Exclude periods (2)		Include all firm (3)	
	R^2	Obs.	R^2	Obs.	R^2	Obs.
Initial value						
Eq1	0.000	34701	-	-	0.003	104732
Eq1 (restricted)	0.000	12857	-	-	0.002	39739
Internal factors						
Eq2	0.002	32308	0.060	21337	0.065	976539
Eq3	0.354	33387	0.517	19720	0.294	40827
Eq2+Eq3	0.509	30508	0.528	18268	0.306	38482
External factors						
Eq4	0.008	34701	0.093	22771	0.050	104732
Eq5	0.018	12857	0.121	8525	0.055	39739
Eq6	0.013	34701	0.120	22771	0.062	104732
Eq5+Eq6	0.025	12857	0.174	8525	0.076	39739
Internal and external factors						
Eq2+Eq3+Eq6	0.398	30508	0.655	17429	0.569	37208
Eq2+Eq3+Eq6 (restricted)	0.381	10301	0.709	4768	0.636	12712
Eq2+Eq3+Eq5+Eq6	0.383	10301	0.723	4768	0.645	12712

The table displays R^2 of different specification. Eq1 to Eq6 refer to specification displayed in Section 3 and reported in Table 3. Eq1 is the model with only a constant and an indicator for time span. Eq2 refers to model with observable time-variant firms' characteristics, Eq3 to models with firm fixed effects. Eq4 to Eq6 concern external factors: Eq4 is the model with country-year dummies, Eq5 models with country-sector-year dummies and Eq6 models with region-year dummies. The combination of equation signals that we include several independent variables in the same model (e.g., Eq2+Eq3 means that we include both time-variant observable firms' characteristics and firm fixed effects). Restricted presents model for a sample of firms for which sector variable is available.

4.2 Extensions

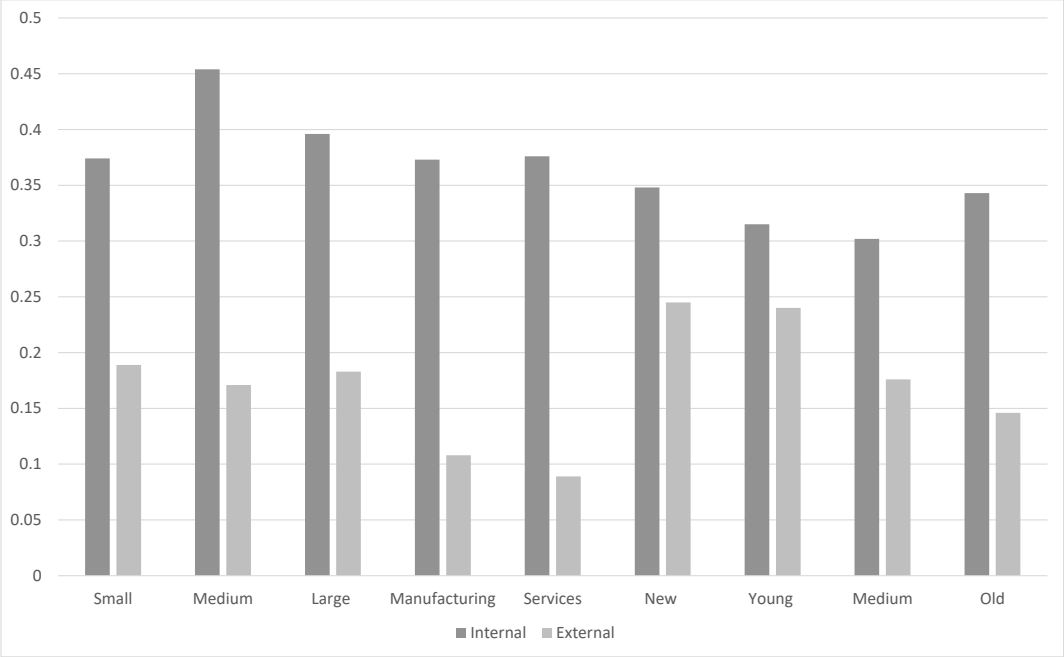
4.2.1 Heterogeneity

We extend our analysis by examining how firm structural characteristics and country attributes influence the relative weight of internal and external factors in explaining variance of firm growth. We first consider the importance of firm attributes, especially their size, age and industry.[7] For size, we consider classification given by the WBES: Small firms (less than 20 employees), Medium firms (between 20 and 99 employees) and Large

[7]In an unreported analysis, we also distinguish foreign firms and domestic firms. However, the difference in sample is too large to be able to compare R^2.

firms (more than 100 employees). For age, we consider age at the beginning of the period and classify firms into four groups: New firms (less than 5 year-old), Young (between 5 and 9 year-old), Medium (between 10 and 19 year-old) and Old (more than 20-year old). Finally, for industry we consider manufacturing and services. We cannot compare results with the global sample but rather between sub-sample.

Figure 3: Sensitivity to firm characteristics



According to findings displayed in Figure 3 (see Table A2 for details), we find no real difference between firms according to their size or sector. The analysis by age is, however, interesting. While internal factors explain more or less the same share of total variance for different groups (dark bars), young firms are more sensitive to external factors (light bars). External factors explain one quarter of variation for new firms (below 5-year old) but less than 15% for old firms (more than 20-year old). In other words, while external context does not matter a lot to explain differences in growth, it seems more crucial for

new and young firms. This result is in line with Coad et al. (2018) indicating that old firms are more able to sustain their previous growth than new firms.

We then consider the role of country-level attributes. We first take into account the income-level, which is a proxy for many unobserved differences across countries (institutions, infrastructure, financial development, etc.). We may expect that firms in richer countries benefit from better business conditions than those operating in low-income countries. We also consider the degree of instability in the country. We expect that countries impacted by external (positive or negative) shocks, irrespective of their nature, will present higher level of output instability. To compute output instability (at a macro-level), we rely on a very simple proxy: the standard deviation of growth from 1995 to 2018.[8]

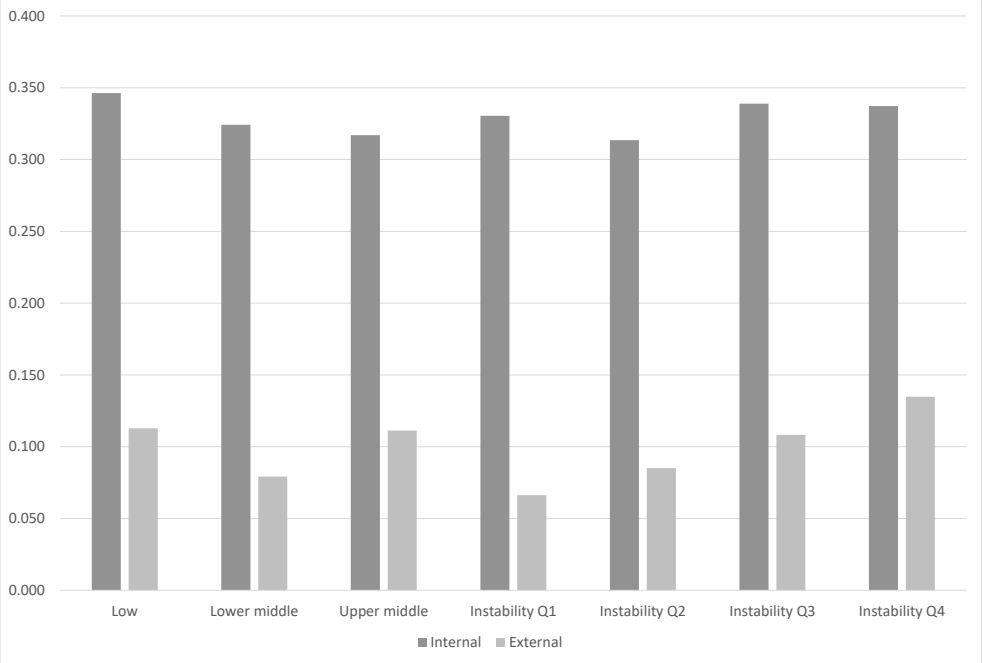
Results, presented in Figure 4, do not signal strong differences according to the level of income. Internal factors seem to be more important in poor economies but this finding is not robust (see Table A3 in the Appendix). The relative importance of external factors is more or less similar for firms in different income-level categories (their impact is reduced for middle category).

Findings from classification of countries according to their level of output instability is much interesting. The first quartile groups together countries with a lower variability in output, and fourth quartile is made up of the most unstable countries. First, while we may expect that unobserved individual characteristics matter a lot to operate in unstable market, we fail to find a clear difference in the explanatory power of internal factors. As expected, external factors are more important in chaotic environment. The contribution of external factors in explaining variance doubles between firms operating in the most stable countries to those in the most unstable economies.

To sum up, our findings indicate that young firms and those operating in unstable countries are more sensitive to external shocks. However, the role played by individual

[8]We also consider more refined indicator of output volatility by using the sum of squared residual of regressions of growth to past growth and a trend for each country (see Cariolle and Goujon, 2015, for a discussion on the best way to measure instability). This measure is highly correlated with simple standard deviation ($\rho = 0.91$) and, consequently, results (available upon request) are very similar when we consider this alternative measure of output instability.

Figure 4: Sensitivity to country characteristics



factors is weakly shaped when we consider different sub-samples.

4.2.2 Firm exit

Finally, we scrutinize how internal and external factors influence firm exit. One might argue that the primary aim of small firm's managers is to maintain their business alive without seeking to grow. As a result, observing that many firms do not grow is rather normal. Firm performance could be weakly correlated to (local and sectoral) shocks because managers do not exploit positive shocks or because managers have developed strategies to cope with negative events. However, one might expect that firm survival is sensitive to economic environment (Aga and Francis, 2017). In period of booms, more firms may be able to stay in the market. At the opposite, during crises, many enterprises leave the floor. In the following, we study whether external factors matter more for firm survival than for firm growth. While we are also interested by the role of firm internal factors in explaining exit, we are limited by our dataset. By construction, we have only

one observation per firm and therefore cannot include firm level control variables.

The WBESs are not dedicated to study exit. We follow the methodology developed by Aga and Francis (2017) to define exit. The method uses the reason reported by the interviewer when she was unable to recontact a firm. Firms are classifed into three groups. The first group includes firms which continue to operate. The second group is made up of firms that are known to have exited the market (closed or bankrupt). The third group consists of firms for which operating status is uncertain (refuse a follow-up interview or are unavailable). Based on these categories, Aga and Francis (2017) create two variables of exit. The first variable is a strict exit that consider only the sample of firms for which status is clear-cut (exited or continuing firms). The second exit dummy (weak) adds as exiters firms with an uncertain status.

Table 6: Determinants of firm exit

	Baseline model				Include firm initial size			
	Strict (1)		Weak (2)		Strict (3)		Weak (4)	
	R^2	Obs.	R^2	Obs.	R^2	Obs.	R^2	Obs.
Eq1	0.000	26047	0.000	42191	0.000	26047	0.000	42191
Eq1 (restricted)	0.000	10263	0.000	16797	0.000	10263	0.000	16797
Internal factors								
Eq2	0.004	21820	0.004	35403	0.004	21820	0.004	35403
Eq3	-	-	-	-	0.015	22056	0.010	35171
Eq2+Eq3	-	-	-	-	0.024	19021	0.017	30176
External factors								
Eq4	0.083	26047	0.122	42191	0.083	26047	0.122	42191
Eq5	0.097	10263	0.152	16797	0.097	10263	0.152	16797
Eq6	0.106	26047	0.151	42191	0.106	26047	0.151	42191
Eq5+Eq6	0.139	10263	0.188	16797	0.139	10263	0.188	16797
All factors								
Eq2+Eq3+Eq6	0.111	21820	0.150	35403	0.121	19021	0.173	30176
Eq2+Eq3+Eq6 (restricted)	0.135	8511	0.176	14079	0.157	7429	0.204	12010
Eq2+Eq3+Eq5+Eq6	0.143	8511	0.183	14079	0.164	7429	0.210	12010

The table displays R^2 of different specification. The dependent variable is a dummy for exit, according to two definitions (see Section 4.3.2). Eq1 to Eq6 refer to specification displayed in Section 3 and reported in Table 3. Eq1 is the model with only a constant and an indicator for time span. Eq2 refers to model with observable time-variant firms' characteristics, Eq3 to models with firm initial size. Eq4 to Eq6 concern external factors: Eq4 is the model with country-year dummies, Eq5 models with country-sector-year dummies and Eq6 models with region-year dummies. The combination of equation signals that we include several independent variables in the same model (e.g., Eq2+Eq3 means that we include both time-variant observable firms' characteristics and firm fixed effects). Restricted presents model for a sample of firms for which sector variable is available.

We examine the determinant of firm exit according to both definitions (strict and

weak). Despite the binary structure of dependent variables, we employ a probability linear model allowing us to compute the share of total variance explained by the model. Unfortunately, we cannot include firm fixed effects because we have one observation per firm. To overcome this issue, we include firm initial size (a set of dummies for each size) in columns (3) and (4). We might expect that initial size captures many unobserved firm's time-invariant characteristics (Ayyagari et al., 2017, 2020). In addition, there is large literature indicating that initial conditions shape the likelihood to survive (Geroski et al., 2010).

Results, displayed in the last two columns of Table 5, are instructive. We cannot direcly compare the importance of internal factors due to the omission of firm-level dummies. Even with the inclusion of firm initial size in the last two columns, firm-level characteristics do not seem to matter ($R^2 < 0.025$). Results, displayed in Appendix (Table A4), largely confirm those reported by Aga and Francis (2017). Large and old firms as well as those lead by experienced managers are more likely to survive. We also fail to detect a difference between foreign-owned and domestic-owned firms.

Interestingly, the impact of external factors seems stronger for exit than for growth. This finding is just suggestive due to differences in models. In addition, the explanatory power of external factors remains rather limited because it explains less than 20% of total variance. In other words, our econometric results suggest that external shocks are more stronger to explain variance in firm exit than variance in firm growth. However, these findings should be treated with caution because models are not directly comparable.

5 Conclusion

The Covid crisis has highlighted the importance of external shocks on firm dynamics worldwide. Developing countries are often hurt by major external shocks that may impede the development of a sound private sector. Our paper examines the relative weight of internal firm characteristics and external shocks to explain variation of firm growth. In doing so, we exploit a rich firm-level panel database from the World Bank Enterprise Surveys combining information on employment growth of 12,562 firms operating in 72 low and middle-income countries. Our approach is data-driven insofar as we do not

explicit internal and external factors but rather assess their explanatory power by block.

Our main findings can be summarized as follows. We show that internal factors, especially time-invariant firm characteristics, explain a half of differences in firm growth. However, the role of internal factors is predominant for leaders (best performers in the long-run) and losers (worst performers). When we exclude leaders and losers the contribution of internal factors is halved. The external shocks at the sector or local level account for less than 10% of differences in variation on average. Third, the impact of internal factors is weakly shaped by firm-level and country-level characteristics, contrary to the role played by external factors. In particular, external factors are more important for new and young firms and for firms operating in unstable environments. Finally, primary econometric results suggest that external shocks are more important to explain exit than growth.

Our statistical analysis provides interesting results regarding the relative weight of internal firm characteristics versus external shocks to explain firm dynamics. However, one might keep in mind that findings are only an average effect. In other words, some shocks can have a profound impact for firms. In addtiion, we do not consider the interaction between internal factors and exogenous events. Recent evidence points out that specific *ex-ante* firm-level attributes are particularly important to favor firm recovery after a shock (e.g., Bowles et al., 2016; Dosso and Léon, 2020). Future works should go forward to by investigating firm's reaction to a specific event. In particular, we should focus on how firms in developing countries cope with shocks before a shock by adoption risk mitigation strategies or after the occurrence of a shock through coping actions.

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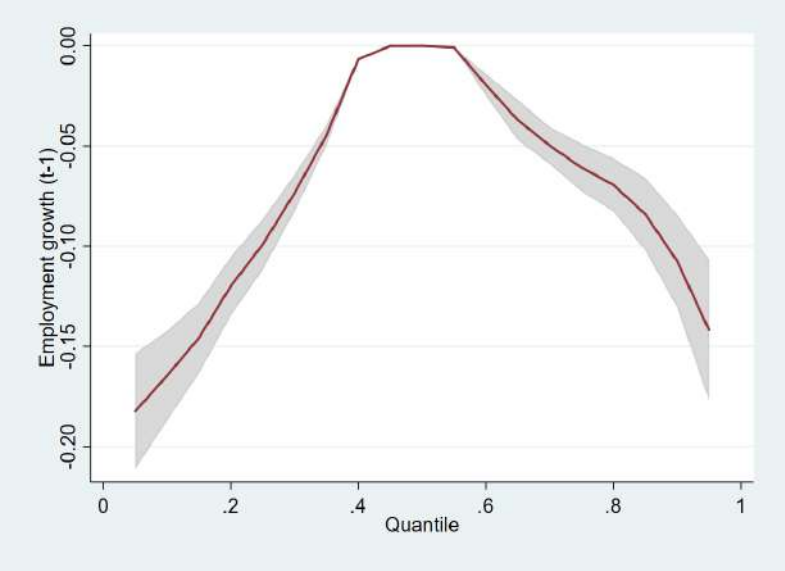
Online Appendix

Firm growth in developing countries: Driven by external shock of internal characteristics?

Figure A1: Firm growth persistence, quantile regression



The figure plots the coefficient associated with lagged growth (in red) and confidence intervals (in grey) using quantile regression where the dependant variable is current growth.

Table A1: Baseline results, complete table

	Baseline		Internal factors			External				All		
	Eq1	Eq1 (rest)	Eq2	Eq3	Eq2+3	Eq4	Eq5	Eq6	Eq5+6	Eq2+3+6	Eq2+3+6 (rest)	Eq2+3+5+6
Time span	-0.013***	-0.015***	-0.011***	-0.020***	-0.008***	-0.012***	-0.016***	-0.012***	-0.016***	-0.001	-0.008***	-0.008***
	(0.001)	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)
Size			-0.039***		-0.267***					-0.269***	-0.305***	-0.308***
			(0.001)		(0.003)					(0.003)	(0.005)	(0.005)
Age			-0.003		-0.029***					-0.040***	-0.029***	-0.032***
			(0.002)		(0.003)					(0.003)	(0.007)	(0.007)
Foreign			0.051***		0.049***					0.040***	0.090***	0.087***
			(0.005)		(0.009)					(0.009)	(0.020)	(0.020)
Manag. Exp.			0.003		0.003					0.010***	0.011	0.013*
			(0.002)		(0.004)					(0.004)	(0.007)	(0.007)
Firm FE				Yes	Yes					Yes	Yes	Yes
Country-Year FE						Yes						
Country-Sector-Year FE							Yes		Yes			Yes
Location-Year FE								Yes	Yes	Yes	Yes	Yes
Obs.	34701	12857	32308	33387	30508	34701	12857	34701	12857	30508	10301	10301
R^2	0.003	0.003	0.046	0.303	0.555	0.054	0.068	0.068	0.097	0.582	0.650	0.658
F-test	85.8***	38.8***	311.0***	149.5***	2170.6***	12.4***	3.3***	4.0***	1.8***	30.4***	15.1***	12.7***

The table reports coefficients associated with time span and firm-level variables. The label refers to those reported in Table 4. All fixed-effects are included when indicated but unreported. *, **, *** refer to significance at the 10%, 5% and 1% level, respectively

Table A2: Contribution of internal and external factors, by group of firms

	Size						Industry			
	Small		Medium		Large		Manufact.		Services	
	R^2	Obs.	R^2	Obs.	R^2	Obs.	R^2	Obs.	R^2	Obs.
Initial value										
Eq1	0.002	15101	0.003	12022	0.003	7578	0.003	8347	0.004	4130
Eq1 (restricted)	0.001	4806	0.005	4649	0.003	3402	-	-	-	-
Internal factors										
Eq2	0.347	13934	0.414	11286	0.231	7088	0.054	7707	0.044	3892
Eq3	0.334	13713	0.368	10397	0.376	6836	0.363	7066	0.349	3424
Eq2+Eq3	0.374	12703	0.454	9938	0.396	6550	0.373	6628	0.376	3274
External factors										
Eq4	0.107	15101	0.057	12022	0.059	7578	0.061	8347	0.049	4130
Eq5	0.134	4806	0.104	4649	0.114	3402	0.068	8347	0.060	4130
Eq6	0.129	15101	0.091	12022	0.104	7578	0.103	8347	0.079	4130
Eq5+Eq6	0.189	4806	0.171	4649	0.183	3402	0.108	8347	0.089	4130
Internal and external factors										
Eq2+Eq3+Eq6	0.708	12374	0.772	9636	0.719	6300	0.699	6453	0.625	3167
Eq2+Eq3+Eq6 (restricted)	0.735	3557	0.787	3507	0.741	2675	-	-	-	-
Eq2+Eq3+Eq5+Eq6	0.740	3557	0.790	3507	0.751	2675	0.700	6453	0.631	3167

	Age							
	New		Young		Medium		Old	
	R^2	Obs.	R^2	Obs.	R^2	Obs.	R^2	Obs.
Initial value								
Eq1	0.007	7314	0.005	7225	0.001	9734	0.001	9772
Eq1 (restricted)	0.008	2617	0.004	2453	0.002	8611	0.001	8928
Internal factors								
Eq2	0.062	6755	0.045	6783	0.039	9214	0.043	9056
Eq3	0.314	7048	0.274	6913	0.292	9366	0.308	9433
Eq2+Eq3	0.348	6512	0.315	6547	0.302	8954	0.343	8979
External factors								
Eq4	0.088	7314	0.077	7225	0.056	9734	0.062	9772
Eq5	0.157	2617	0.146	2453	0.097	3611	0.089	3928
Eq6	0.135	7314	0.128	7225	0.094	9734	0.092	9772
Eq5+Eq6	0.245	2617	0.240	2453	0.179	3611	0.146	3928
Internal and external factors								
Eq2+Eq3+Eq6	0.645	6361	0.593	6383	0.586	8734	0.589	8557
Eq2+Eq3+Eq6 (restricted)	0.711	2100	0.682	1913	0.684	2953	0.664	3155
Eq2+Eq3+Eq5+Eq6	0.725	2100	0.699	1913	0.701	2953	0.684	3155

The dependent variable is the absolute growth in column (1), the relative growth in column (2) and two exit dummies in the remaining columns. The table displays R^2 of different specification. Eq1 to Eq6 refer to specification displayed in Section 3 and reported in Table 3. Eq1 is the model with only a constant and an indicator for time span. Eq2 refers to model with observable time-variant firms' characteristics, Eq3 to models with firm fixed effects. Eq4 to Eq6 concern external factors: Eq4 is the model with country-year dummies, Eq5 models with country-sector-year dummies and Eq6 models with region-year dummies. The combination of equation signals that we include several independent variables in the same model (e.g., Eq2+Eq3 means that we include both time-variant observable firms' characteristics and firm fixed effects). Restricted presents model for a sample of firms for which sector variable is available.

Table A3: Contribution of internal and external factors, by country characteristics

	Income level						Degree of instability							
	Low		Lower middle		Upper middle		1st quartile		2nd quartile		3rd quartile		4th quartile	
	R2	Obs.	R2	Obs.	R2	Obs.	R2	Obs.	R2	Obs.	R2	Obs.	R2	Obs.
Eq1	0.001	6181	0.003	16087	0.002	12433	0.002	11347	0.002	8307	0.004	7221	0.002	7826
Eq1 (restricted)	0.000	2142	0.005	5828	0.002	4887	0.003	4313	0.001	2847	0.003	2687	0.003	3010
Internal factors														
Eq2	0.072	5650	0.042	14888	0.045	11770	0.033	10694	0.041	7866	0.053	6586	0.075	7162
Eq3	0.305	5907	0.313	15416	0.286	12007	0.322	10961	0.280	7982	0.300	6904	0.300	7540
Eq2+Eq3	0.346	5337	0.324	14504	0.317	11573	0.330	10483	0.314	7746	0.339	6287	0.337	6955
External factors														
Eq4	0.083	6181	0.036	16087	0.064	12433	0.023	11347	0.005	8307	0.071	7221	0.085	7826
Eq5	0.081	2142	0.052	5828	0.083	4887	0.434	4313	0.063	2847	0.069	2687	0.103	3010
Eq6	0.097	6181	0.047	16087	0.083	12433	0.031	11347	0.064	8307	0.089	7221	0.105	7826
Eq5+Eq6	0.113	2142	0.079	5828	0.111	4887	0.066	4313	0.085	2847	0.108	2687	0.135	3010
All factors														
Eq2+Eq3+Eq6	0.577	5240	0.572	13962	0.605	11249	0.548	10128	0.575	7476	0.616	6137	0.621	6767
Eq2+Eq3+Eq6 (restricted)	0.617	1616	0.624	4748	0.694	3924	0.609	3657	0.676	2120	0.680	2093	0.679	2431
Eq2+Eq3+Eq5+Eq6	0.622	1616	0.646	4748	0.698	3924	0.622	3657	0.680	2120	0.683	2093	0.687	2431

The dependent variable is the relative growth. The table displays R^2 of different specification. Eq1 to Eq6 refer to specification displayed in Section 3 and reported in Table 3. Eq1 is the model with only a constant and an indicator for time span. Eq2 refers to model with observable time-variant firms' characteristics, Eq3 to models with firm fixed effects. Eq4 to Eq6 concern external factors: Eq4 is the model with country-year dummies, Eq5 models with country-sector-year dummies and Eq6 models with region-year dummies. The combination of equation signals that we include several independent variables in the same model (e.g., Eq2+Eq3 means that we include both time-variant observable firms' characteristics and firm fixed effects). Restricted presents model for a sample of firms for which sector variable is available.

Table A4: Determinants of firm survival

	Exit strict			Exit weak		
	Eq2+Eq3	Eq2+Eq3 +Eq6	Eq2+Eq3 +Eq5+Eq6	Eq2+Eq3	Eq2+Eq3 +Eq6	Eq2+Eq3 +Eq5+Eq6
	(1)	(2)	(3)	(4)	(5)	(6)
Time span	-0.018*	-0.008	0.004	-0.004	0.004	0.001
	(0.010)	(0.011)	(0.019)	(0.013)	(0.015)	(0.027)
Size (log)	0.015***	0.016***	0.015***	0.017***	0.021***	0.020***
	(0.002)	(0.002)	(0.004)	(0.003)	(0.003)	(0.005)
Age (log)	0.007***	0.010***	0.009**	0.025***	0.026***	0.018***
	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.006)
Foreign	0.003	0.002	-0.00	0.019*	0.004	-0.020
	(0.008)	(0.008)	(0.012)	(0.010)	(0.010)	(0.016)
Manag. Exp. (log)	0.013***	0.014***	0.013**	0.016***	0.023***	0.021***
	(0.004)	(0.004)	(0.006)	(0.005)	(0.005)	(0.007)
Birth size	Yes	Yes	Yes	Yes	Yes	Yes
Location-Year FE	No	Yes	Yes	No	Yes	Yes
Country-Sector-Year FE	No	No	Yes	No	No	Yes
Obs.	19021	19021	7429	30176	30176	12010
R2	0.024	0.121	0.164	0.017	0.173	0.210

The dependent variable is a dummy equals to 1 if a firm survive and 0 if a firm exit. Eq2 refers to model with observable time-variant firms' characteristics, Eq3 to models with firm fixed effects. Eq5 models with country-sector-year dummies and Eq6 models with region-year dummies. The combination of equation signals that we include several independent variables in the same model (e.g., Eq2+Eq3 means that we include both time-variant observable firms' characteristics and firm fixed effects). *, **, *** refer to significance at the 10%, 5% and 1% level, respectively

"Sur quoi la fondera-t-il l'économie du monde qu'il veut gouverner? Sera-ce sur le caprice de chaque particulier? Quelle confusion! Sera-ce sur la justice? Il l'ignore."

Pascal

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